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ENERGY EFFICIENT DATA COMMUNICATION SYSTEM FOR WIRELESS SENSOR NETWORK USING BINARY TO GRAY CONVERSION

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ABSTRACT

Wireless sensor networks (WSN) requires low cost devices and low power operations. Wireless sensor network is self configuring network and it is made up of small sensor nodes. Today energy saving in WSN is become pervasive job. In this system we proposed a new technique for saving energy at both transmitter and receiver; it involves data encoding technique which converts binary number into gray code. The benefit of this system is if we compare binary number with gray code then probability of occurrence of 1's is more in binary as compared to gray code, and converted number is transmitted through transmitter. This system is able to save energy at transmitter as well as receiver; energy saving at transmitter is 19.5% and at receiver is able to save 39% energy. And this system can be applied to most of the communication system used today.

Keywords: Binary to Gray code Conversion, Communication System, Data Transmission rate, Energy, Wireless Sensor Networks.

I.INTRODUCTION

Wireless sensor networks (WSNs) typically utilize highly energy constrained, low cost sensor devices that are deployed in areas that are difficult to access and with little or no network infrastructure. In most scenarios, such battery powered sensor devices are expected to operate over prolonged periods of time. Communication being a major source of power drain in such networks, energy efficient communication protocols that can be implemented with low hardware and software cost/complexity are thus of paramount importance in WSNs to reduce the device recharging cycle periods and hence provide connectivity for longer durations at a stretch. [1] In now a days there are various schemes are provided for wireless communication, this utilizes nonzero voltage levels for the transmission of data. By using this kind of data transmission technique they also keep both the transmitter and the receiver switched on for the entire duration of the transmission of a data frame, because of this the data loss is occurred during transmission as well as receiver. [2] Sensors are resource constrained in battery power, memory, communication and computation capabilities. Sensors have many applications in military field surveillance, health care, environmental monitoring, and accident reporting and law enforcement. [3]

II. RELATED WORK

In practice, most existing transmission schemes not only utilize non-zero voltage levels for both 0 and 1 so as to distinguish between a silent and a busy channel, they also keep both the transmitter and the receiver switched on for the entire duration of the transmission of a data frame. Communication strategies that require energy expenditure for transmitting both0 and 1 bit values are known as *energy based transmission* (EbT) schemes that involve the use of silent periods as opposed to energy based transmissions. However, for an *n*-bit binary string, the duration of transmission is in general significantly longer than *n.* [4].

TSS protocol proposed we show that for AWGN noisy channels; there is an average savings of 20%in battery energy at the transmitter for equal likelihood of all possible binary strings of a given length. Simultaneously, there is a savings of 36.9% energy at the receiver. An efficient algorithm involving only addition (and no multiplication or division) for conversion from binary to ternary and vice versa is used in order to keep the energy consumed for the radix conversion process low at both the transmitter and the receiver. Coupled with the low cost and low complexity of transceiver, these savings clearly demonstrate the usefulness of TSS for low power wireless sensor networks, particularly for multi-hop communications. [5] [6] [7]

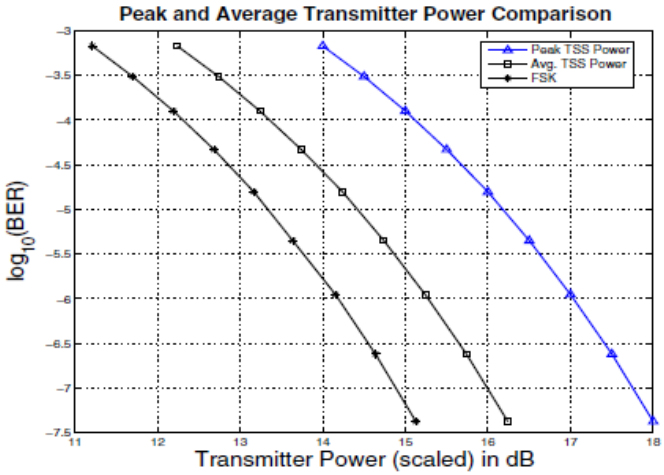

Fig1: Comparison of peak and average transmitter power (scaled) for given BER

III. PROPOSED WORK

Wireless sensor network is self-configuring network and it is made up of small sensor nodes. These nodes are able to communicate among themselves using radio signals. [8] These nodes are also called as motes. The components of any wireless sensor network involve radio trans-receiver antenna, and micro-controller. By including all these components it forms a network and transmits the data at transmitter and receiver. This proposed system involves WSN communication, and this is energy efficient communication system which is able to save energy at transmitter and receiver. This system basically uses data encoding technique which converts binary number into gray and transmitted through transmitter. At the receiver gray number is converted into binary, and data is received in binary form. This proposed system is able to save 19.5% energy at

transmitter and up to 36% energy at receiver. As this system is very efficient because it does not involve multiplication and division, instead it only involves addition.

1.1. Proposed System Block Diagram

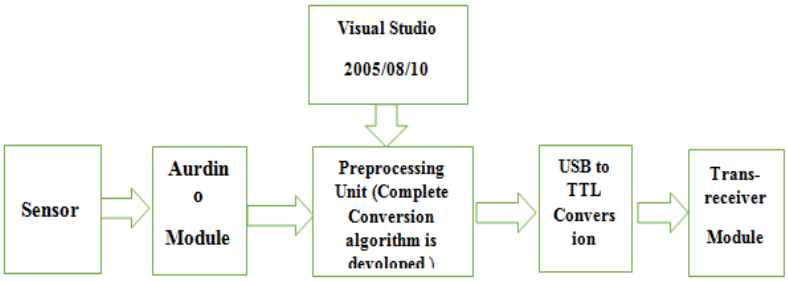

Fig2: Transmitter of System

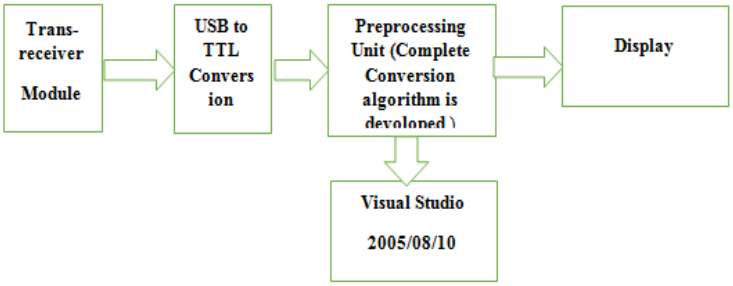

Fig3: Receiver of System

In this scheme reading is from sensor module and after that decimal number is processed and after that will be in binary for processing but instead of processing binary number it is converted into gray code and then data transmission is done, Vice a versa process will be done at receiver end. There are various advantages of gray code over binary number if we compare binary number with gray code. In conversion of binary to gray does not involve any division and multiplication instead it involves addition. This can save energy at transmitter and receiver; and this algorithm can be implemented efficiently. Above figure shows the block diagram of proposed system which involves transmitter and receiver.

1.2. Algorithm of System

Algorithm for Conversion of a Number from Binary to Gray

Step 1: Check decimal value is empty or not, if not empty then proceed further.

Step 2: Extract analog input signal into digital (decimal) output using ADC.

Step 3: Convert these decimal values into binary values.

Step 4: Define an array with 8-bit length & then check if value is greater than or equal to 8,if yes then exit the function else proceed further.

Step 5: Declare the local variable=0 and extract the 1stlocation of array string & store it to the variable for ex. X and assume it as a default MSB bit Simultaneously assign variable value to

Step 6: Increment the value of local variable by 1 and then store that variable to x1 as another local variable.

Step 7: Increment the local variable and then store variable to y1 as another local variable.

Step 8: Compare the x1 & y1 variable, if they are equal then append '0' to the previously stored MSB bit (X) defined (extracted) in step no 6

Step 9: If they are not equal then append "1" to the MSB bit (X).

Step 10: Repeat the above steps till your array is not greater than 8.When array is above 8 then stop the process.

IV. RESULTS and DISCUSSION

This paper defines a new algorithm to save energy at the time of data transmission using data encoding algorithm which converts binary number into gray code. The proposed system is able to save energy at transmitter and receiver by using efficient algorithm which is conversion of binary to gray code at the transmitter and vice versa at the receiver. This system is able to save up to 19.5% energy at transmitter and 36% energy at receiver. And this is very simple algorithm which is applied to any communication system to save energy.

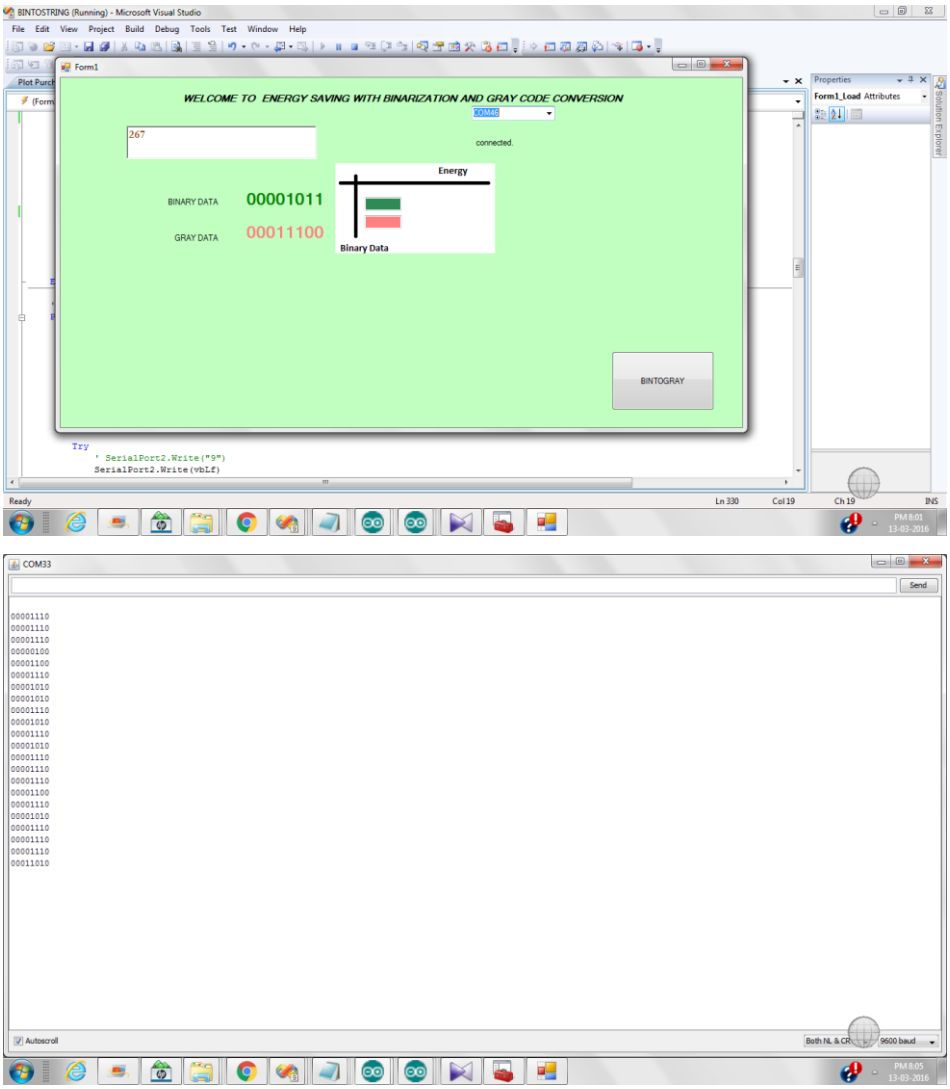

Fig 4: Bar charts for the result

V.CONCLUSION

This paper describes methodologies to save energy at the time of data transmission; by using this methodologies can save energy at transmitter and receiver by using efficient algorithm which is conversion of binary to gray code at the transmitter and vice versa at the receiver. It can save 19% of energy at transmitter and about 39% energy at receiver; we can use this system in much communication system or in 3G cellular network system.

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